Appendix 9B

Description of Aquifer Avoidance/Minimization (AA/M) Route Alternative, Existing Environment, and Construction-Related Impacts

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Route Description

The Aquifer Avoidance/Minimization (AA/M) Route Alternative is shown in Figure 9B1. This route description was prepared by Longhorn as a result of developing a construction cost estimate.

This route would intersect and tie-in to the old Exxon Pipeline Company (EPC) sections of Longhorn pipeline approximately 12 miles southwest of Brenham, Texas. This tie-in would be at Milepost 93 (MP 93) on the existing Longhorn pipeline. The route then goes northwest for approximately 114 miles to a point approximately 15 miles southwest of Waco, Texas. The route then turns west for approximately 125 miles, then generally west-southwest for 130 miles to the tie-in point near Big Lake. The total route mileage is 370 and ties in to MP 406.

The route would be through areas of moderate density of population and a fairly high density of roads and highways that would require boring or directional drilling. In addition, many creeks, streams, and rivers would be crossed by this route. The number of pipeline crossings that would be required by this route is not known. Pipeline crossings have been identified from large-scale maps. The crossings that have been identified by Longhorn are as follows:

- 102 bored county roads;
- 45 bored farm-to-market roads;
- 9 directional drilled state highways;
- 14 directional drilled US highways;
- 1 directional drilled interstate highway;
- 2 bored railroads and 4 directional drilled (with highways) railroads;
- 17 directional drilled creeks;
- 24 ditched creeks;
- 10 directional drilled major streams or rivers, and
- Unknown number of foreign pipeline or utility crossings.

This pipeline route would pass through hilly and uneven terrain from MP 0 to the Colorado River at MP 250, which is about 50 miles east of San Angelo, Texas. The construction estimates prepared by Longhorn for this area are based on digging rock ditch from approximately MP 115 to MP 300, which is 185 miles, or approximately one-half of the pipeline length. The estimate is based on normal trenching operations for the remaining one-half of the pipeline.

Description of Existing Environment Along the AA/M Route Alternative

The information that follows has been drawn from the 1987 All-American Pipeline Supplemental Environmental Impact Statement (SEIS).

Hydrology

As shown in Figure 9B-2, the AA/M Route Alternative from Austin County to Reagan County would avoid several sensitive aquifers or portions of aquifers that are crossed by the existing Longhorn pipeline. From east to west, the AA/M Route Alternative would traverse the Gulf Coast Brazos River Alluvium, and the Sparta, Queen City, Carrizo-Wilcox, Trinity Lipan, and Edwards-Trinity aquifers. The AA/M Route Alternative would avoid the highly sensitive Colorado River Alluvium, Edwards Aquifer Balcones Fault Zone (BFZ), and would minimize the karsted and most sensitive portion of the Edwards-Trinity Aquifer.

One municipal water supply would be within a two-mile corridor of the AA/M Route Alternative.

As shown in Figure 9B-2, the AA/M Route Alternative would cross three major surface water drainage basins: Brazos, Colorado, and Rio Grande. The AA/M route would cross approximately 20 named water channels within these three basins with some streams being crossed more than once. Most of these are intermittent creeks and draws. The AA/M route would cross only seven major channels of major sensitive water bodies. They are listed in association with their drainage basin in the table.

Major Water Body Crossings by the AA/M Route Alternative

	Creek/River	Drainage Basin		Creek River	Drainage Basin
1	Middle Yegua Creek	Brazos River	**5**	Lampasas River	Brazos River
2	Yegua Creek	Brazos River	**6**	Colorado River	Colorado River
3	Little River	Brazos River	**7**	South Concho River	Colorado River
4	Leon River	Brazos River	**8**	Dove Creek	Colorado River

Geology

The AA/M Route Alternative would cross three major geologic provinces. From east to west these include the Edwards Plateau, Central Texas Plateau, and Gulf Coastal Plain.

Approximately 40 percent of the AA/M route would cross Tertiary through Quaternary age sand and clay coastal plain sediments from the Houston area to Cameron. The topography is very flat across Quaternary sediments to gently rolling across the Tertiary sediments.

The AA/M route would cross the Central Texas Plateau province between Temple to near San Angelo. Pennsylvanian through Cretaceous-aged limestone, sandstone, and shale bedrock are exposed across the maturely eroded plateaus in this region. The topography is flat to rolling with locally steep slopes along major incised drainages. Stairstep topography occurs where flat-lying hard limestone is interbedded with softer shale or marl and exposed on slopes.

The Edwards Plateau along this route is composed of limestone, dolomite, and marl of the Edwards Group, which is overlain in topographically high areas by limestone with interbedded marl of the Buda formation. The topography is generally flat where the route traverses an upland divide between major drainages, with localized moderate relief where the plateau surface is incised by streams.

Aquatic Biology

Of the water bodies that would be crossed, only seven support important freshwater fisheries, according to stream classifications prepared by U.S. Fish and Wildlife Service (FWS). These include Yegua Creek, Little River, Leon River, Colorado River, Lampasas River, South Concho River, and Dove Creek.

A total of 96 fish species occurs in the seven streams potentially affected by the AA/M Route Alternative. Of these, 36 are considered important in terms of recreational or commercial

value. The most important recreational fish species in most of these streams are members of the catfish, sunfish, and temperate bass families. Other members of the sunfish family represent some recreational value. The channel, blue, and flathead catfishes are the principal species sold commercially and are important sport fish.

No federally listed endangered or threatened species are known to occur in streams that would be crossed by the AA/M Route Alternative. Two federal candidate fish species are known to occur in the study area: Guadalupe bass and the sharpnose shiner. The Guadalupe bass is known to inhabit Dove Creek, South Concho River, and the Colorado River. The sharpnose shiner inhabits the Colorado River.

Terrestrial Biology

The AA/M Route Alternative would potentially affect five of the 11 major ecological areas of Texas described by Gould (1962) and modified by the Texas Parks and Wildlife Department (TPWD) (1978). These are the Oak Woods and Prairies, Blackland Prairies, Edwards Plateau, Llano Uplift, and the Rolling Plains. These vegetation regions are shown in Figure 9B-1.

The four major plant types of cover that would be crossed by the AA/M route include mesquite-juniper, mesquite, oak-mesquite-juniper (parks and woods), and post oak (parks and woods). Agricultural (ranching and farming) lands account for the largest land use area crossed by this route.

The 364 miles of the AA/M Route Alternative would traverse a variety of wildlife habitats and pass through the distribution ranges of many species. The white-tailed deer is the dominant big game animal along the AA/M route and throughout the state. White-tailed deer population levels are currently high on the Edwards Plateau, with herd size often exceeding the estimated carrying capacity and resulting in damage to deer range. Other dominant mammals include javelina, mule deer, pronghorns, and jackrabbit. Some common non-game mammals are the armadillo, coyote, fox, and striped skunk. The rangelands of the Edwards Plateau, Rolling Plains, and Blackland Prairies support the Rio Grande wild turkey along the AA/M route from Reagan to Milam counties. Bobwhite, scaled quail, and mourning dove also occupy several habitats along the route. The bobwhite and mourning dove are common game birds along the route.

A variety of non-game mammals, birds, reptiles, and amphibians are supported by habitats along the AA/M Route Alternative. There is a much greater occurrence of agriculture along the AA/M route, and wildlife habitat and representative species would reflect that land use.

The threatened and endangered species considered for the AA/M route include those federally classified species provided by the FWS as well as other federally listed or candidate species. While there are no plants listed, 11 federally classified endangered wildlife species occur in the geographic region crossed or potentially affected by the AA/M route. The table below lists the protected species and their status.

AA/M Route Alternative Protected Species

Common Name	Federal Status	Common Name	Federal Status
Bald Eagle	LT/PDL	Navasota Ladies'-tresses	LE
Black-capped Vireo	LE	Concho Water Snake	LT
Golden-cheeked Warbler	LE		

LT: Federally listed as threatened
LE: Federally listed as endangered
PDL: Proposed for delisting

Cultural Resources

Forty-two known archaeological and historical sites would be located within the AA/M Route Alternative corridor, of which six would fall within the actual 100-ft wide construction right-of-way (ROW). However, these figures cannot be regarded as accurate reflections of the total number of sites which actually exist within the corridor because less than 5 percent of the total land area within the corridor has been intensively inventoried for cultural resources.

Recreation

All of the land involved with the AA/M Route Alternative is privately owned except for lands owned by The University of Texas in Reagan County. Recreational activities along this route alternative include primarily hunting (small and large game and birds), exotic game viewing, fishing, and boating. Hunting occurs throughout the area on private farms and ranches leased by private hunting clubs for deer and waterfowl hunting. The route would not cross any designated recreation areas or facilities, wildlife refuges, or national parks, but many recreational areas would be located in close proximity. Figure 9B-1 shows the state parks along this route. In addition, a large amount of hunting occurs on private land.

Of the seven watercourses traversed, only the Colorado River and Little River are considered excellent fishing rivers. (The other rivers are difficult to access due to private land ownership or are not considered particularly good for fishing.) In addition, the Colorado, Little, South Concho, and Leon rivers provide opportunities for canoeing and rafting.

Figure 9B1. Aquifer Avoidance/Minimize Route Alternative

Not available electronically

Figure 9B2. Aquifers Crossed and Avoided

Not available electronically